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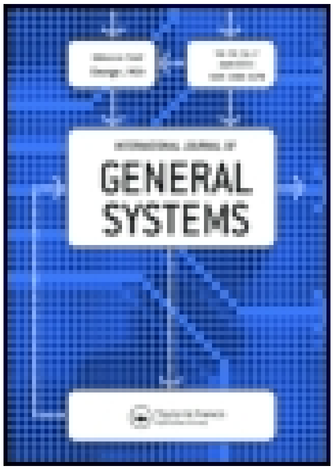

International Journal of General Systems
Publication details, including instructions for authors and subscription information:
http://www.tandfonline.com/loi/ggen20

A Review of: "INTRODUCTION [Adot] LA THÉORIE DES SOUS-ENSEMBLES FLOUS".† I. ELÉMENTS THÉORIQUES DE BASE (Introduction to the Theory of Fuzzy Sets. 1. Elements of Theoretical Foundations) by A. Kaufmann, with a Preface by Lofti A. Zadeh, Masson et Cie, Paris, 1973.

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Published online: 31 May 2007.

To cite this article: C. P. BRUFER (1975) A Review of: "INTRODUCTION [Adot] LA THÉORIE DES SOUS-ENSEMBLES FLOUS".† I. ELÉMENTS THÉORIQUES DE BASE (Introduction to the Theory of Fuzzy Sets. 1. Elements of Theoretical Foundations) by A. Kaufmann, with a Preface by Lofti A. Zadeh, Masson et Cie, Paris, 1973., International Journal of General Systems, 2:1, 120-120, DOI: 10.1080/03081077508960278

To link to this article: http://dx.doi.org/10.1080/03081077508960278

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the many small steps. These too are found in this series.

In spite of my criticisms, this is a seminal publication in systems ecology.

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INTRODUCTION À LA THÉORIE DES SOUS-ENSEMBLES FLOUS.†

I. ELÉMENTS THÉORIQUES DE BASE (Introduction to the Theory of Fuzzy Sets. 1. Elements of Theoretical Foundations) by A. Kaufmann, with a Preface by Lofti A. Zadeh, Masson et Cie, Paris, 1973.

The theory of fuzzy sets, initiated by Lofti A. Zadeh,[1] is a successful attempt to pull down the barriers set up by dichotomic logic, which is too constraining in most human applications.

A fuzzy set is a set E with a map f from E into unit interval [0, 1]. Goguen generalized this notion by considering f as a map from E into a lattice.[2] Of course, other extensions can be imagined by considering richer structures than lattices. The question is: is it worthwhile?

The publication of Professor Kaufmann's book is an important event as it means that fuzzy notions are now commonly accepted because they have been found useful. In several forthcoming volumes, A. Kaufmann will show the wide range of applications of the concept of fuzzy sets.

This first volume is devoted to theoretical aspects of the theory of fuzzy sets. The author mainly gives definitions involving sets, linear graphs, relations, order, similarity, logic, and category. He tries to show how to create "fuzzy mathematics." We may regret the absence of deep theoretical treatment but it is not the purpose of the book to go into abstract mathematics. We first have to understand the basis, then choose between abstract or applied In this respect, Kaufmann's book is a success.

Let me take the opportunity of thanking Professor Kaufmann as he greatly contributed to popularizing modern mathematics among engineers. By a feedback process, more mathematics have been asked for, thus, A. Kaufmann also contributed to the development of mathematics. Applied and pure mathematicians have to be grateful to him for his consequent work and for his lessons of pedagogy.

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2. Goguen, J. A., "L-Fuzzy Sets", *J. Math. Analysis and Applications*, **18**, 1967, pp. 145–174.

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†English translation will be published by Academic Press, New York, later in 1975.

PREFACE TO "INTRODUCTION À LA THÉORIE DES SOUS-ENSEMBLES FLOUS" (INTRODUCTION TO THE THEORY OF FUZZY SETS) by A. Kaufmann†

The theory of fuzzy sets is, in effect, a step toward a rapprochement between the precision of classical mathematics and the pervasive imprecision of the real world—a rapprochement born of the incessant human quest for a better understanding of mental processes and cognition.

At present, we are unable to design machines that can compete with humans in the performance of such tasks as recognition of speech, translation of languages, comprehension of meaning, abstraction and generalization, decision-making under uncertainty and, above all, summarization of information.

In large measure, our inability to design such machines stems from a fundamental difference between human intelligence, on the one hand, and machine intelligence, on the other. The difference in question lies in the ability of the human brain—an ability which present-day digital computers do not possess—to think and reason in imprecise, non-quantitative, fuzzy terms. It is this ability that makes it possible for humans to decipher sloppy hand-writing, understand distorted speech and focus on that information which is relevant to a decision. And it is the lack of this ability that makes even the most sophisticated largescale computers incapable of communicating with humans in natural—rather than artificially-constructed—languages.

The fundamental concept in mathematics is that of a set—a collection of objects. We have been slow in coming to the realization that much

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